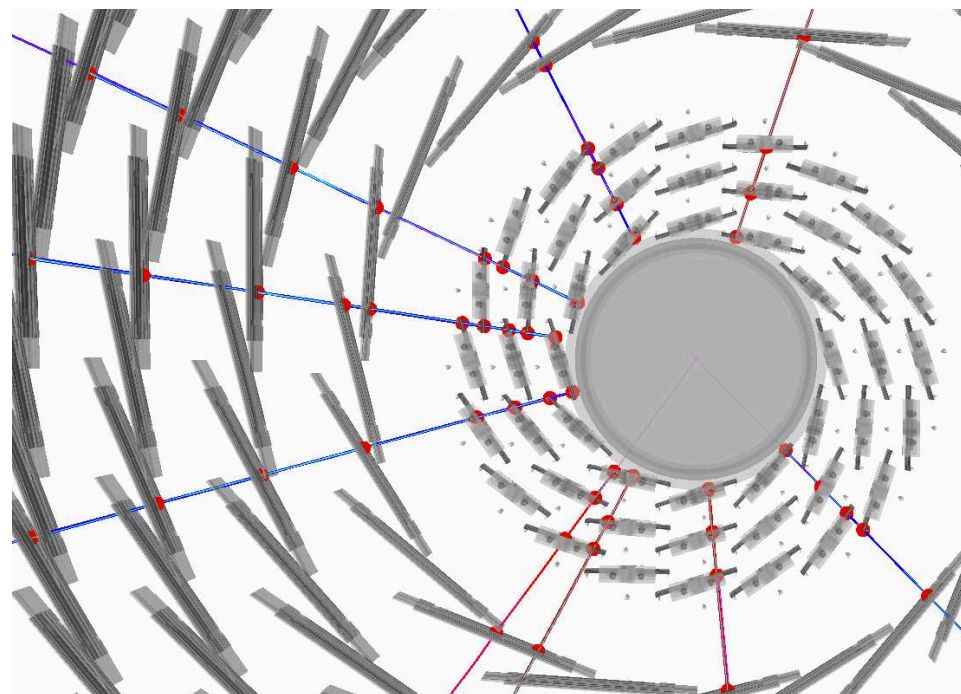


Updates on PHG4KalmanPatRec

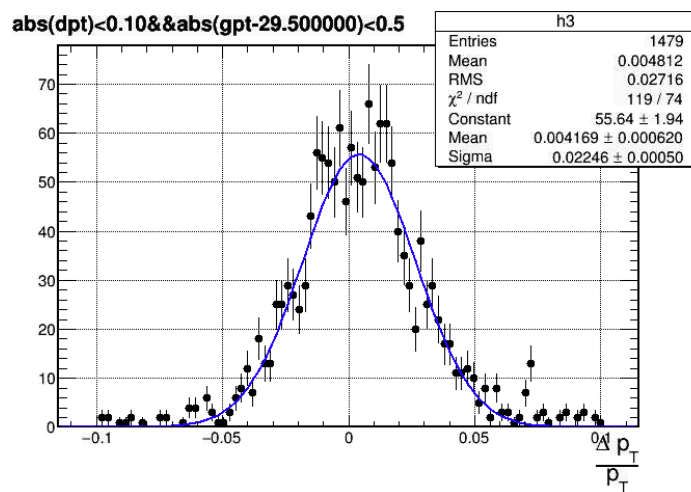
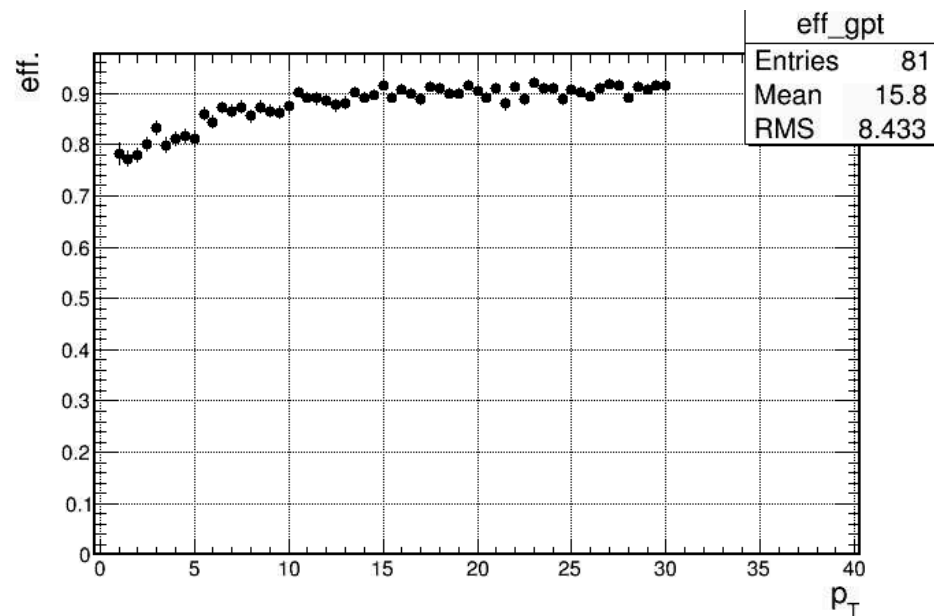
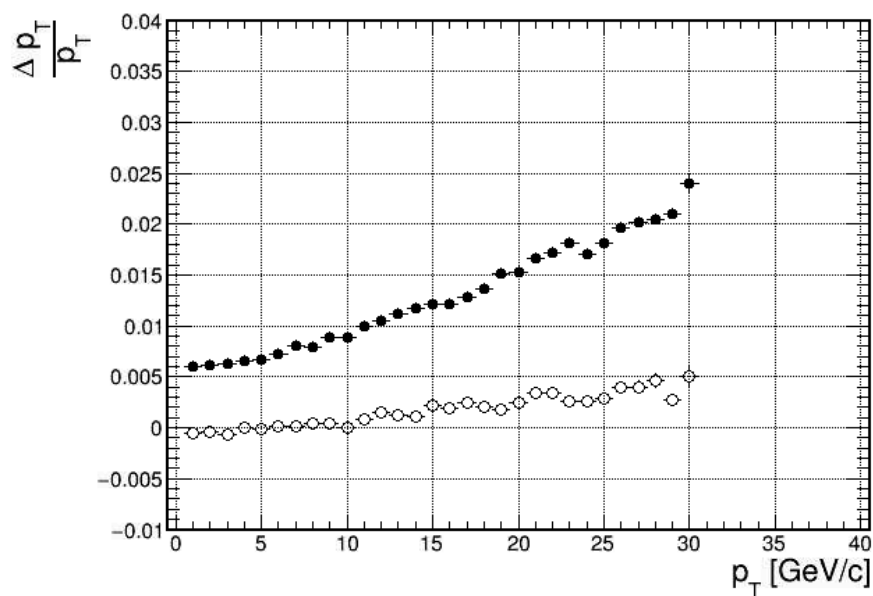
Christof Roland(MIT), Anthony Frawley(FSU),
Jin Huang(BNL), Haiwang Yu (NMSU)

Updates since last week

- Seeds cleanup
 - bin seeds by ϕ , η , d_r , d_z
 - merge seeds in neighbor bins
 - largely reduce number of seeds needs to be processed
 - multiple hits in one layer
- Norm vector rotation
 - Similar as in the refitting module
- PHG4KalmanPatRec:
 - <https://github.com/HaiwangYu/coresoftware/tree/KlamanPatRec>

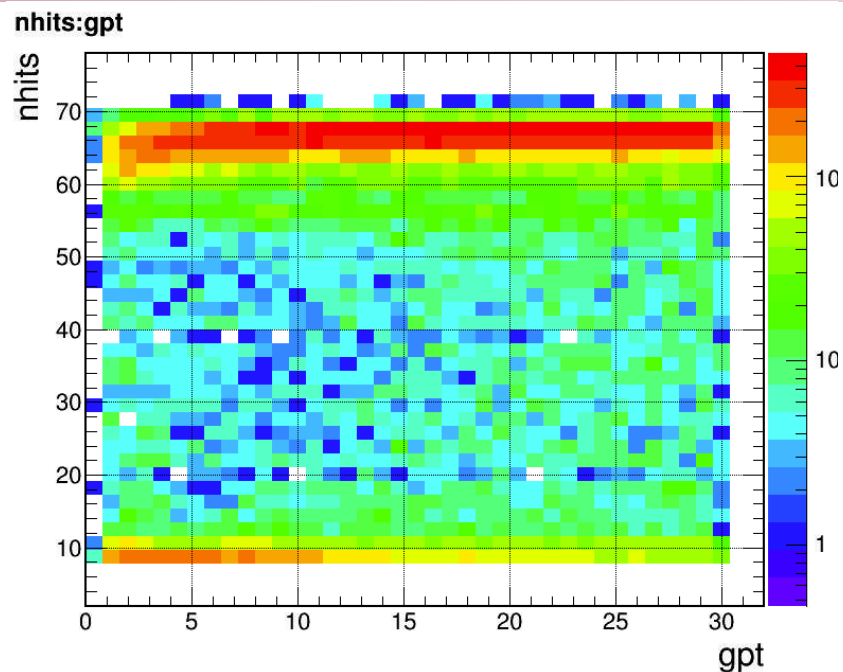


Performance, 5σ search window, ana.49



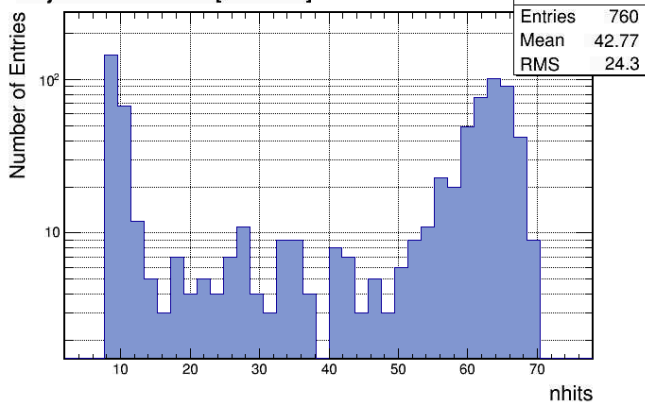
Cluster association

5σ search window,
ana.49



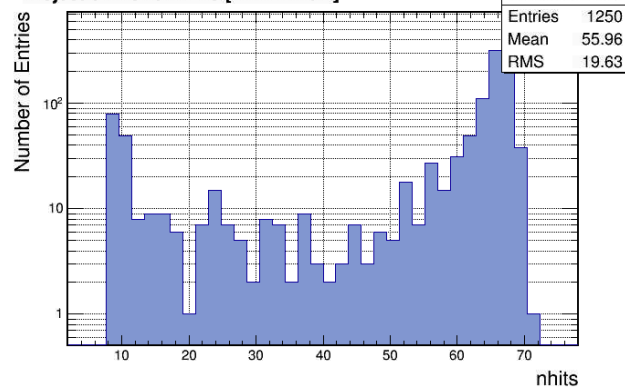
1GeV

ProjectionY of binx=2 [$x=0.8..1.6$]



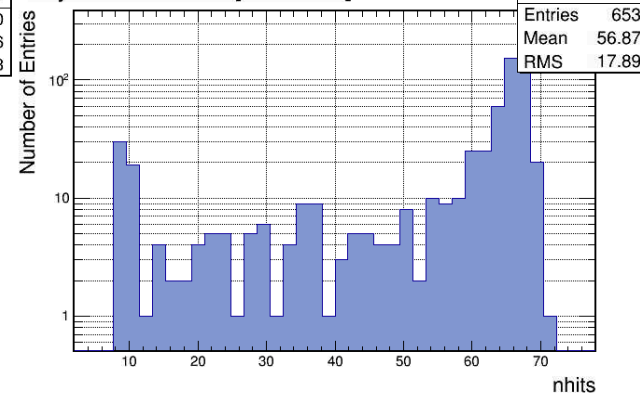
15GeV

ProjectionY of binx=19 [$x=14.4..15.2$]

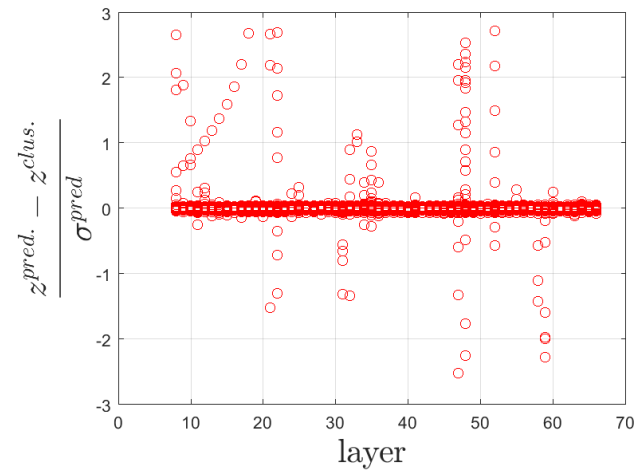
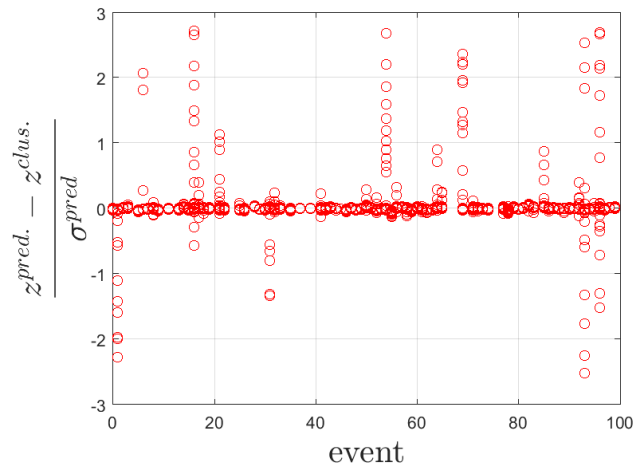
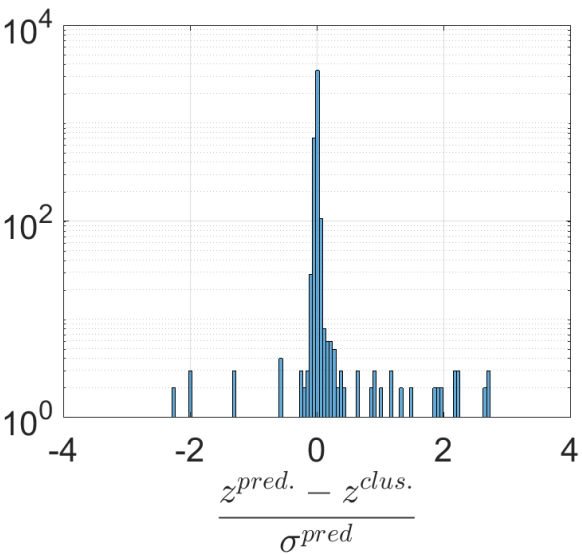
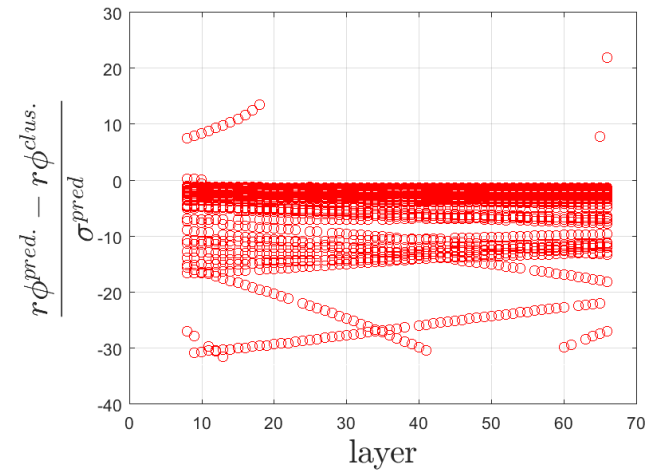
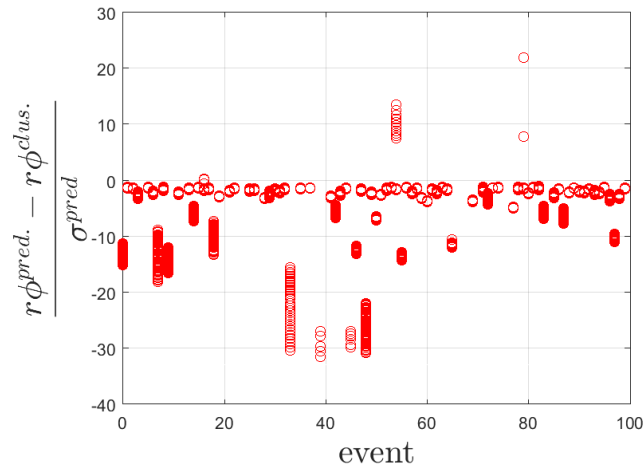
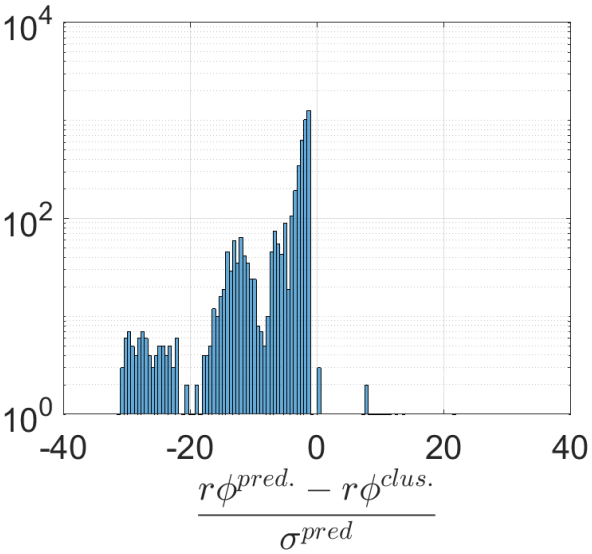


30GeV

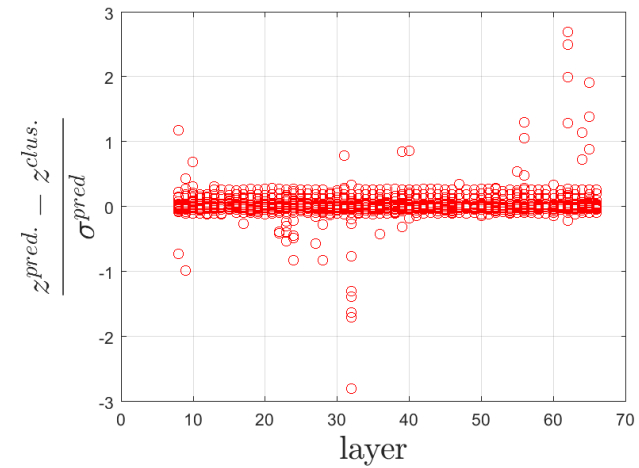
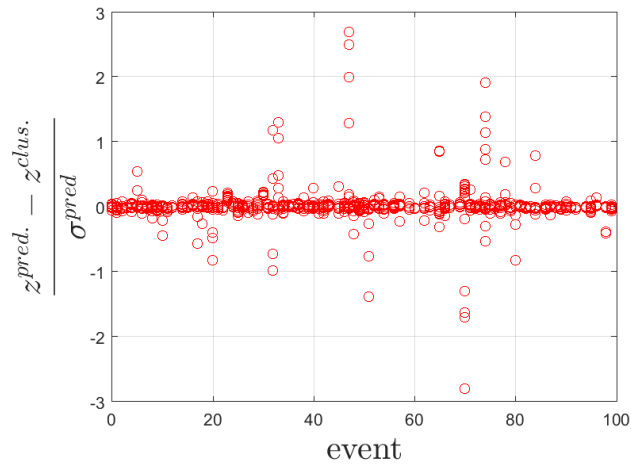
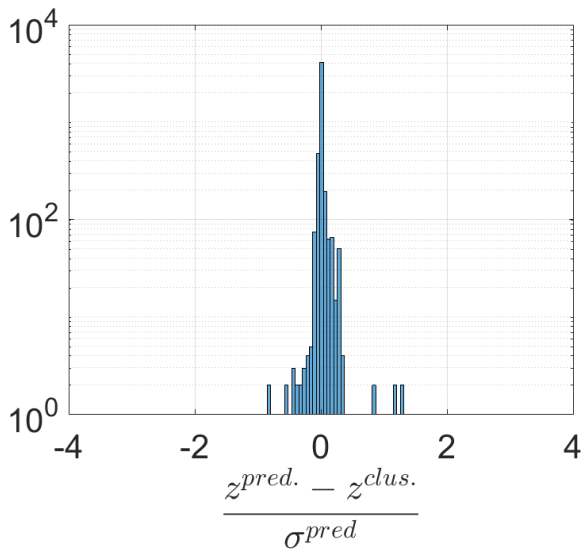
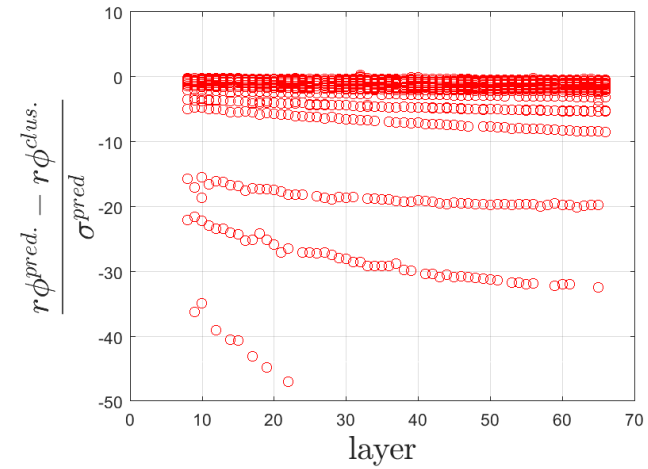
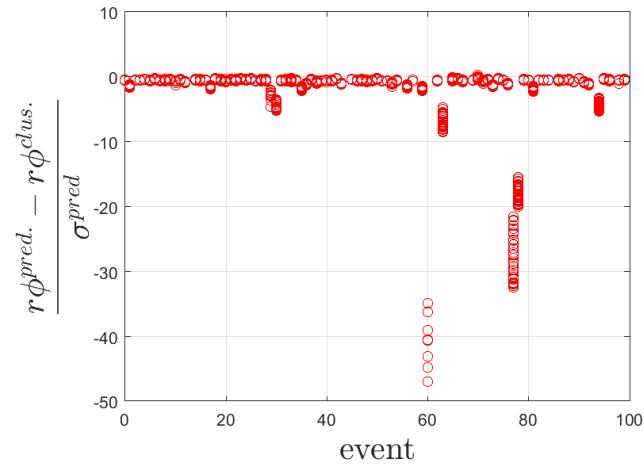
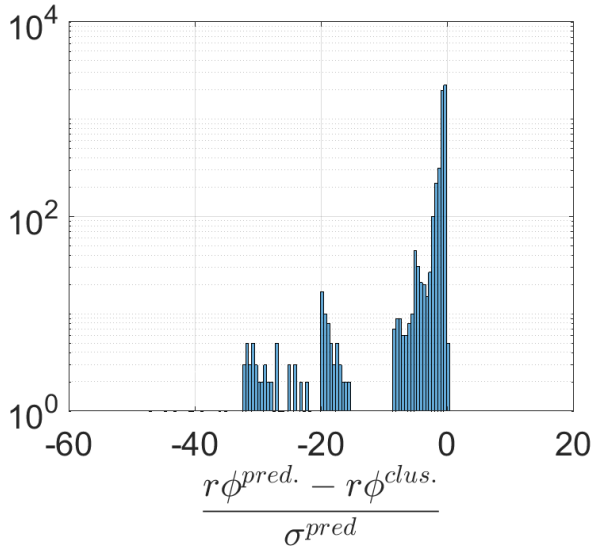
ProjectionY of binx=38 [$x=29.6..30.4$]



Kalman updater issue, 2GeV

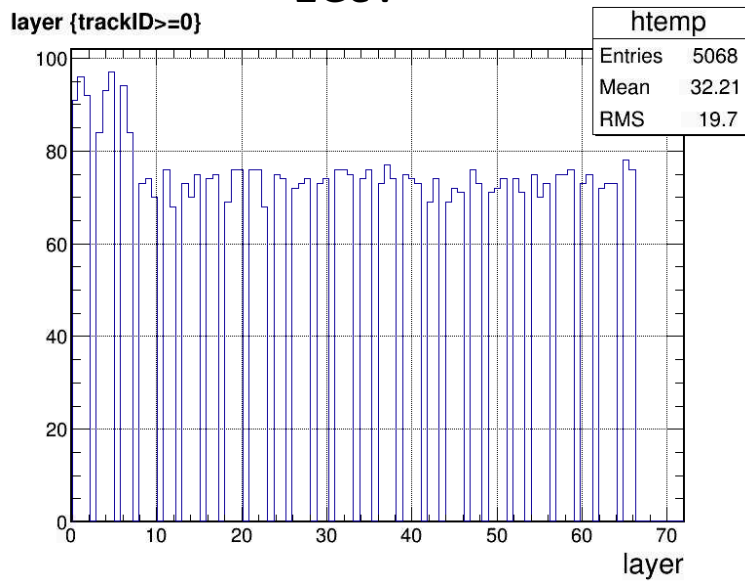


Kalman updater issue, 30GeV

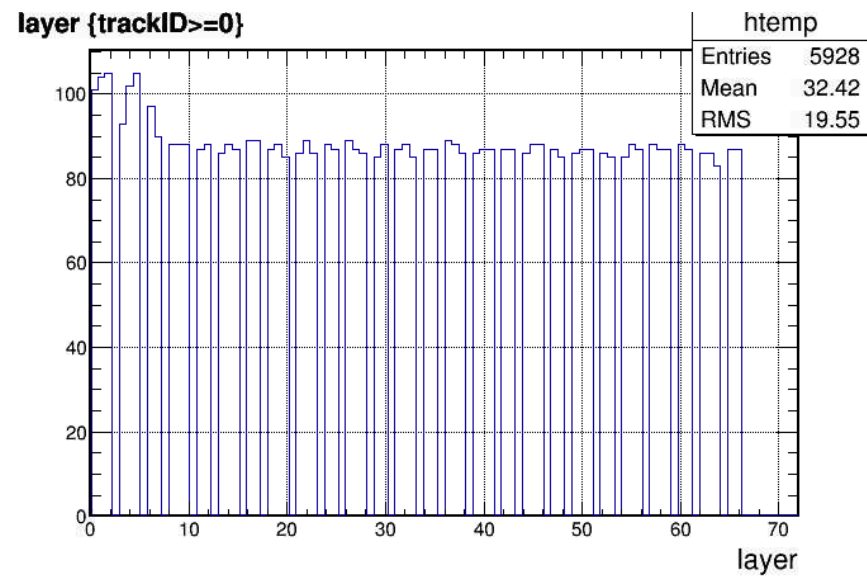


$$|\Delta r\phi| < 30\sigma, |\Delta z| < 3\sigma$$

2GeV



30GeV



Cluster map

layer: 7 (128)

z: 11 (2048)

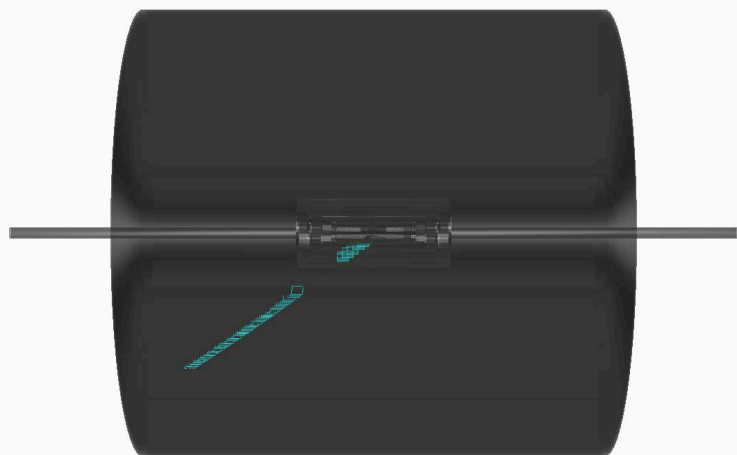
rphi: 14 (16384)

`std::bitset` \Rightarrow simple bit operations (\ll , $\mid=$)

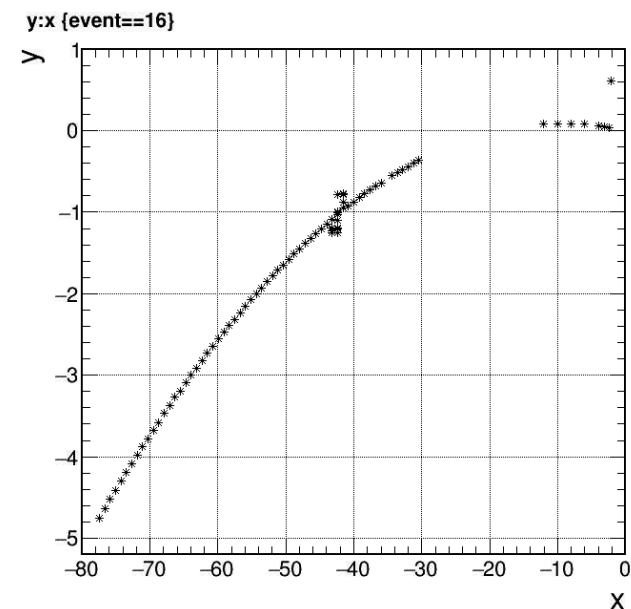
Backups

Other Problems

$\eta = -0.82$



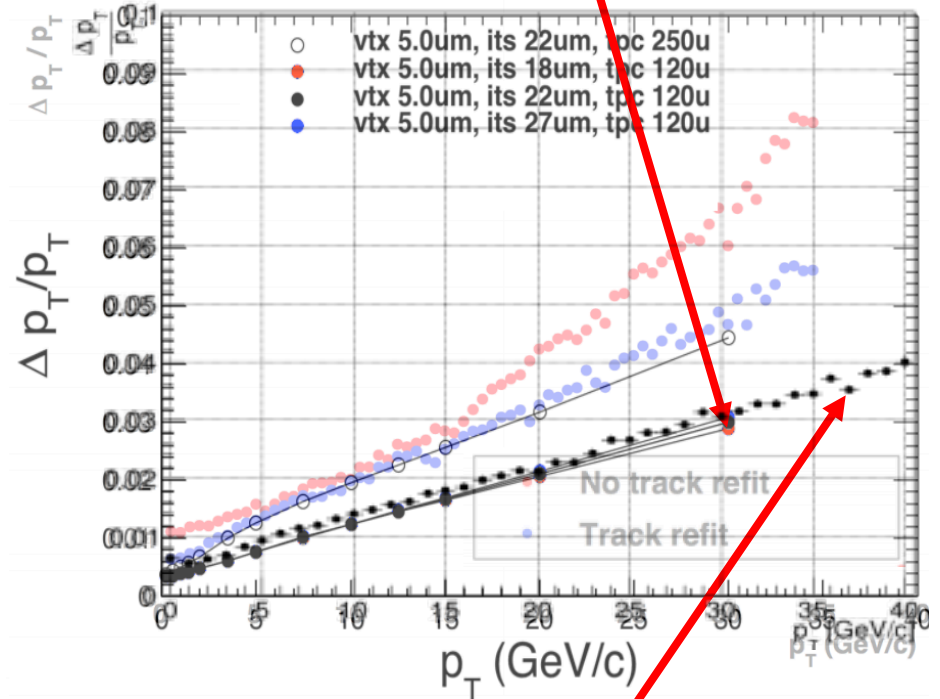
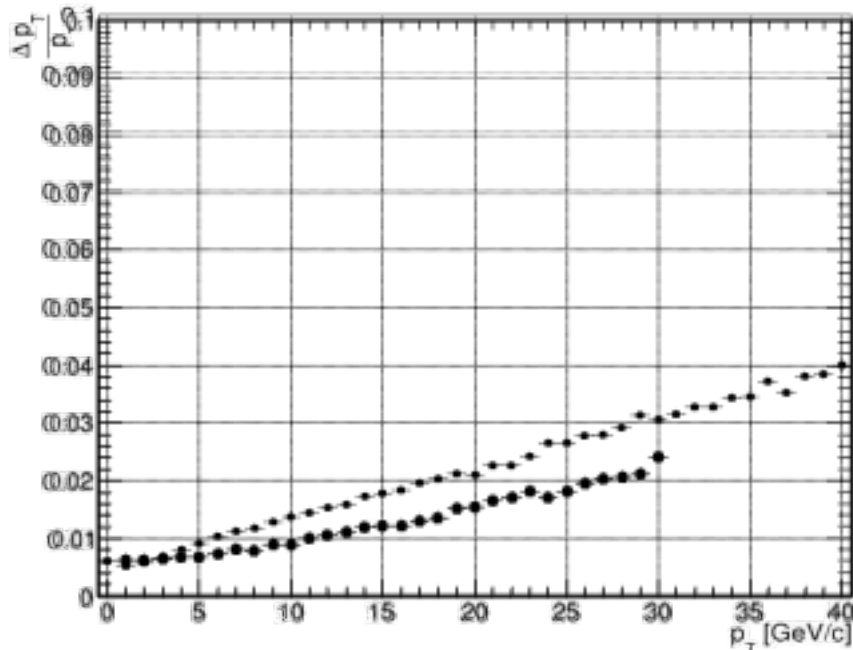
ϕ step



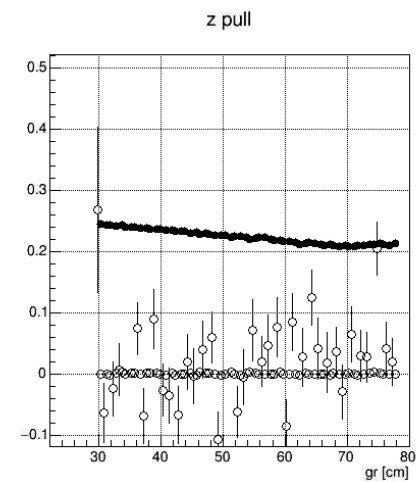
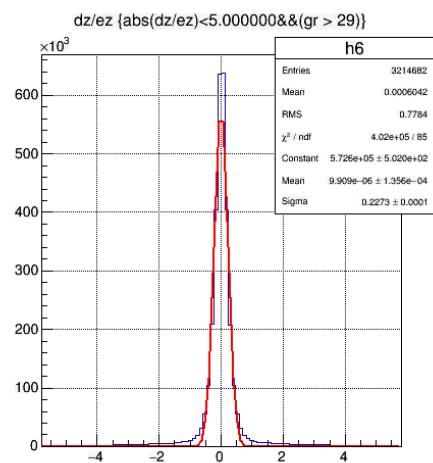
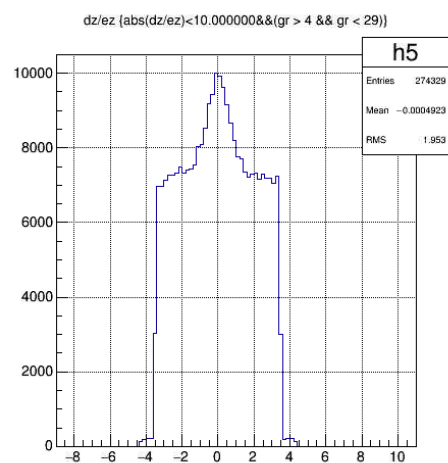
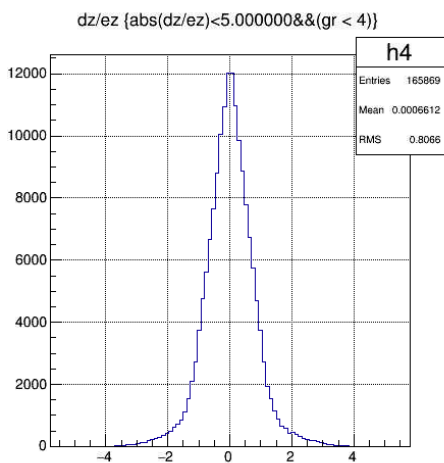
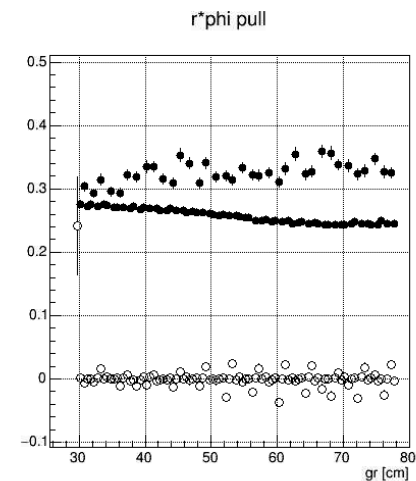
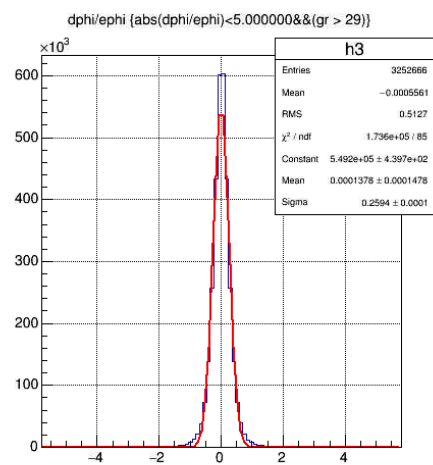
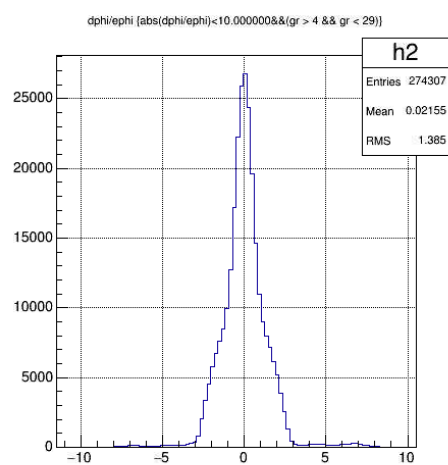
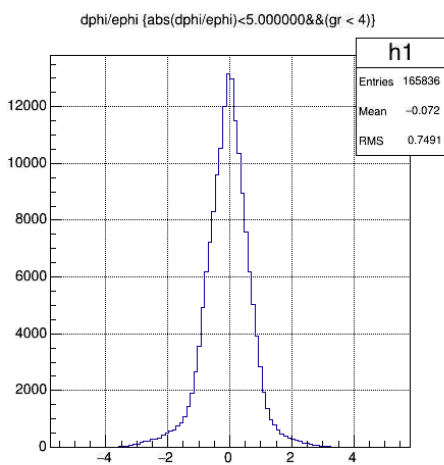
```
2776 =====
2777 2328: event: 4: itrack: 0: layer: 8
2778 =====
2779 2356: layer: 8: rphi: -25.878704 +- 1174.663696; z: -28.753578 +- 132.443954
2780 2363: layer: 8: phi: -0.829579 +- 37.655512
2781 2585: layer: 8, rphi: {0, 11673}, z: {0, 1551}, found #clusters: 1
2782 2376: new_cluster_IDs size: 1
2783 2404: measurements.size(): 1
2784 2412: incr_chi2s_new_tracks.size(): 1
2785 2421: First candidate: IncrChi2: 395.462
2786 2460: updateOneMeasurementKalman:
2787 itrack: 0, layer: 8, #meas: 1, #tracks: 1, #total tracks: 1
2788 IncrChi2: 395.462
2789
```

Comparison

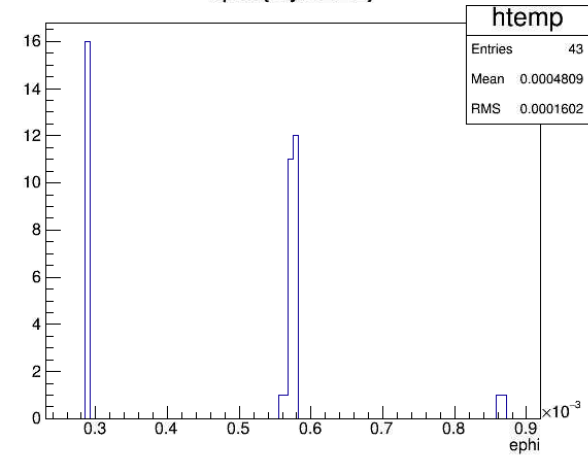
Bench mark: ILC Kalman filter by Christof Roland



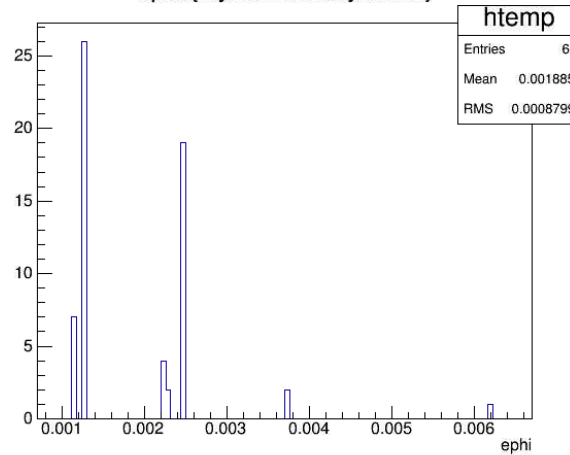
New: Geant4 + Ideal Pattern Recognition + Full Kalman fit (GenFit2)



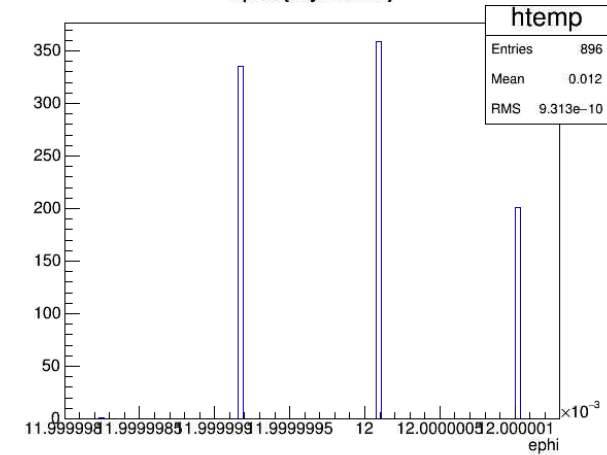
ephi {layer<=2}



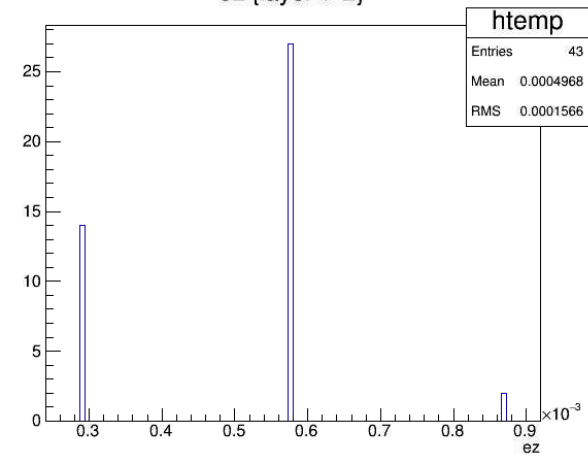
ephi {layer>=3&layer<=6}



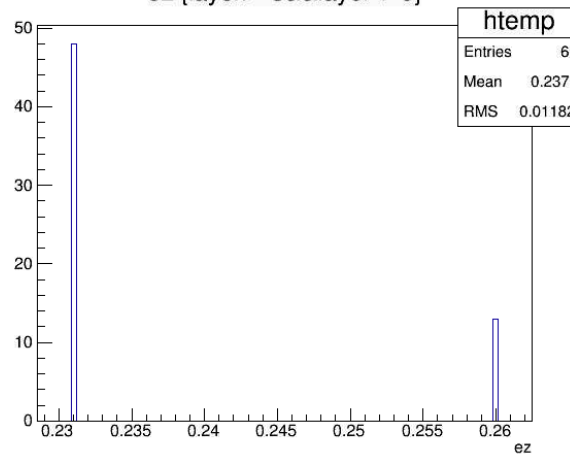
ephi {layer>=7}



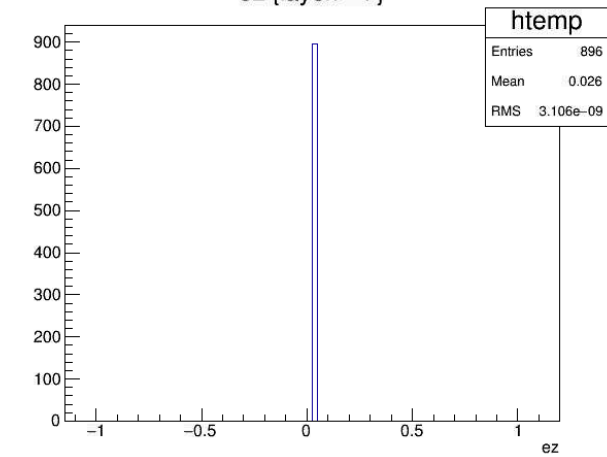
ez {layer<=2}

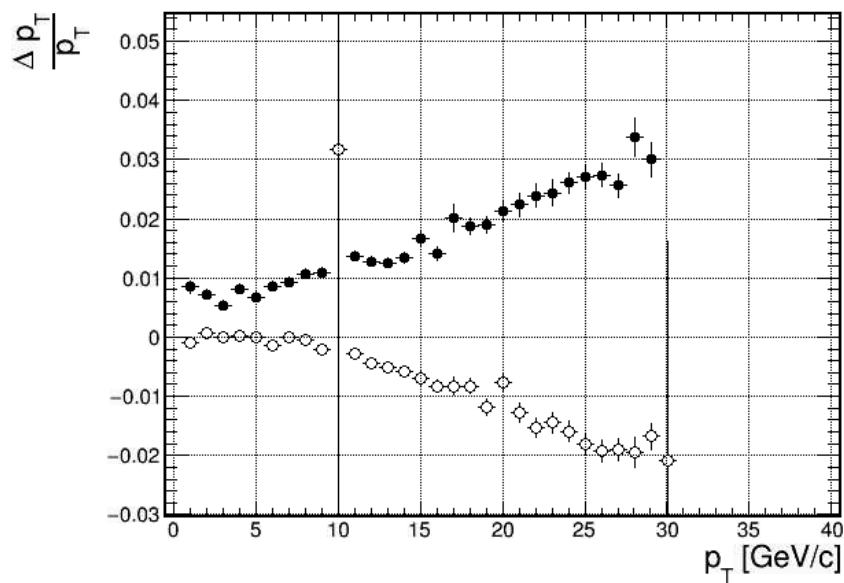
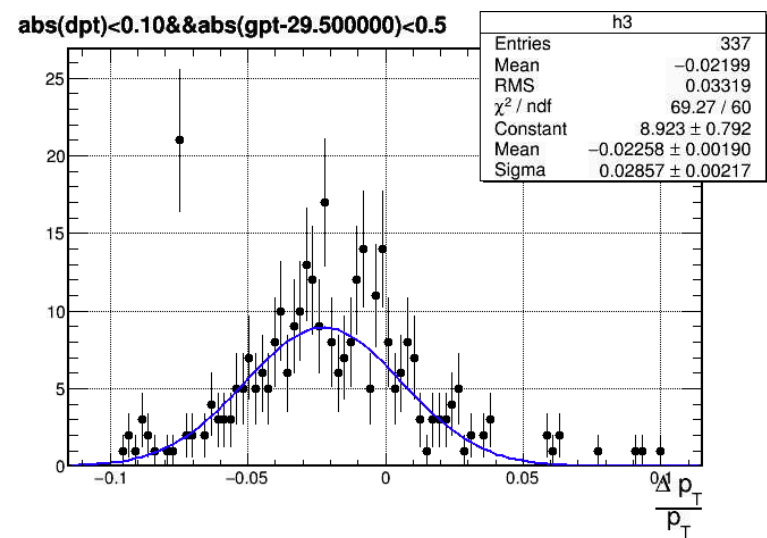
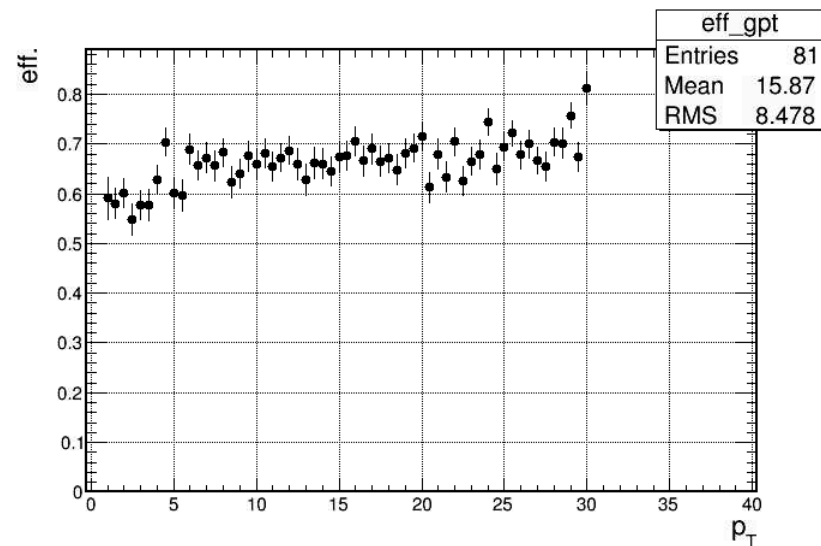


ez {layer>=3&layer<=6}

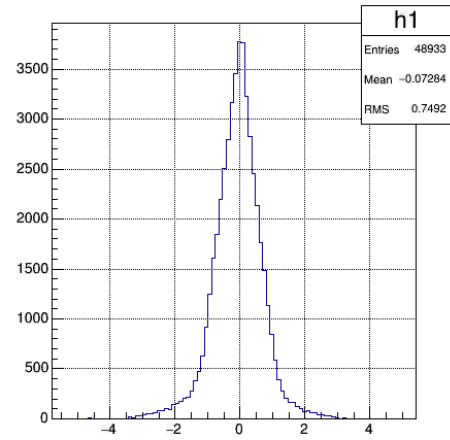


ez {layer>=7}

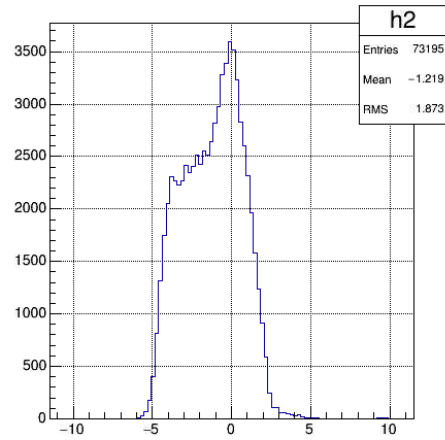




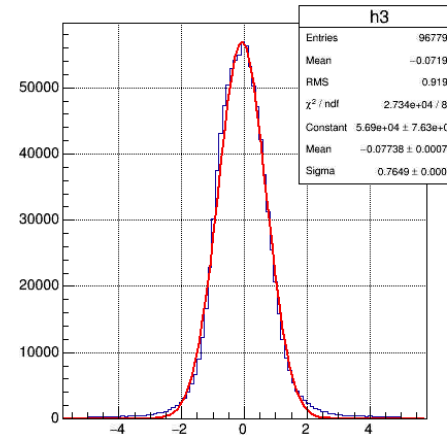
dphi/ephi {abs(dphi/ephi)<5.000000&&(gr < 4)}



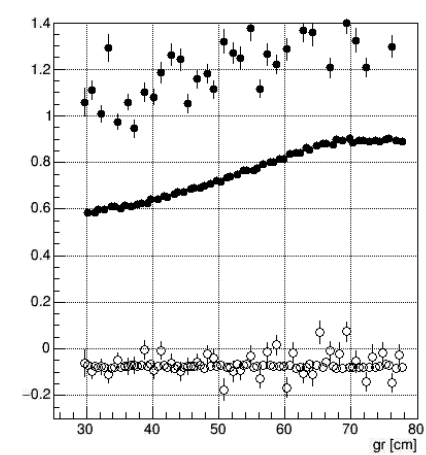
dphi/ephi {abs(dphi/ephi)<10.000000&&(gr > 4 && gr < 29)}



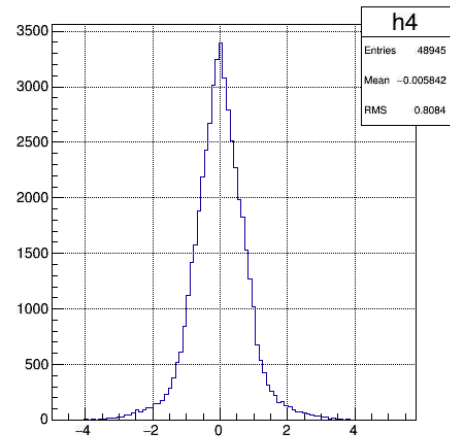
dphi/ephi {abs(dphi/ephi)<5.000000&&(gr > 29)}



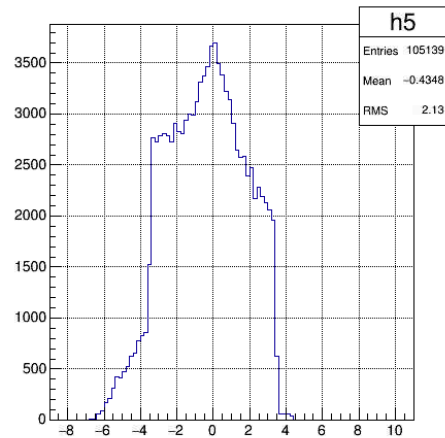
r*phi pull



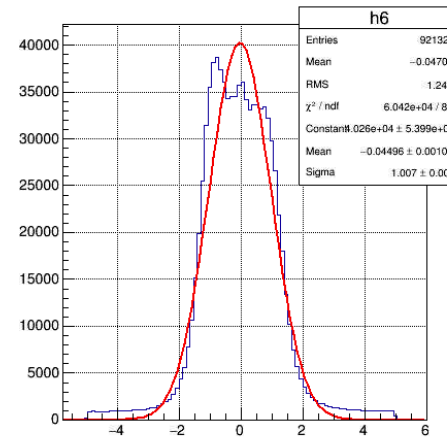
dz/ez {abs(dz/ez)<5.000000&&(gr < 4)}



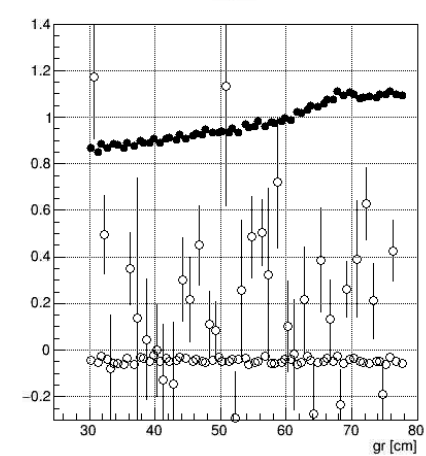
dz/ez {abs(dz/ez)<10.000000&&(gr > 4 && gr < 29)}



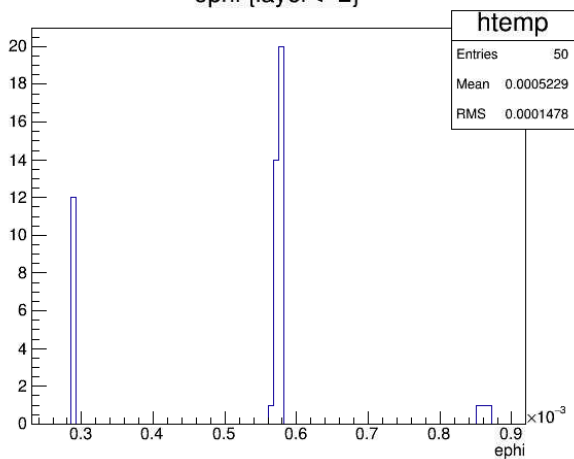
dz/ez {abs(dz/ez)<5.000000&&(gr > 29)}



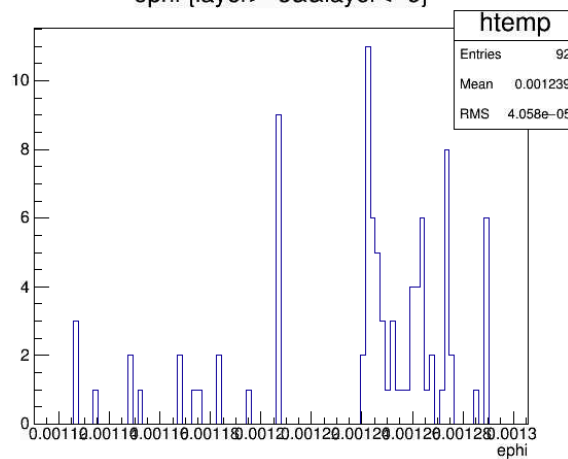
z pull



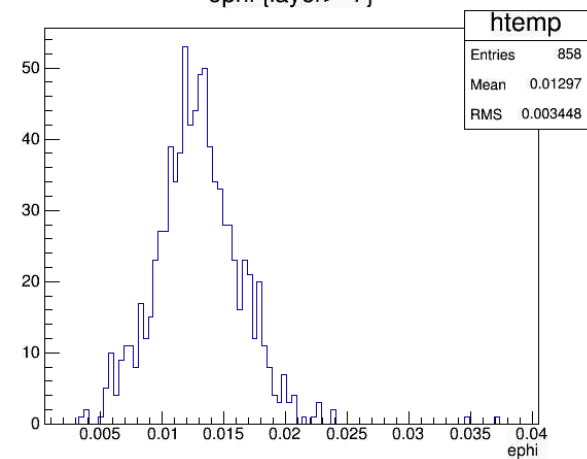
ephi {layer<=2}



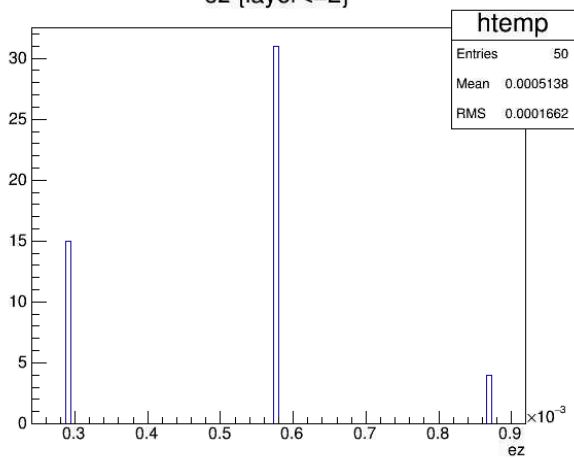
ephi {layer>=3&&layer<=6}



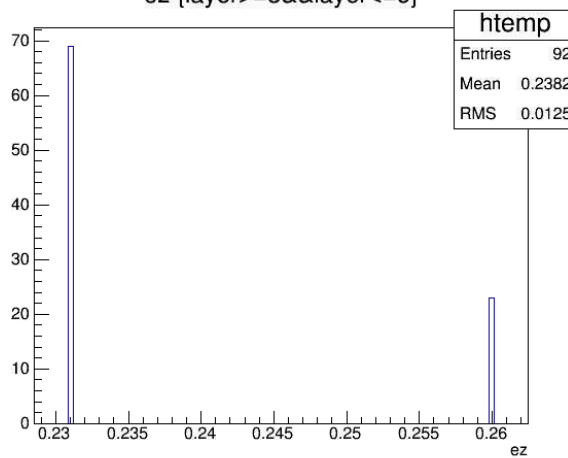
ephi {layer>=7}



ez {layer<=2}



ez {layer>=3&&layer<=6}



ez {layer>=7}

